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ABSTRACT

Focusing on Texas nonmetropolitan areas, this study described recent population changes, identified probable causes of change, examined demographic and economic correlates and the likelihood of continued trends. Population changes from 1960 to 1970 in 164 nonmetropolitan incorporated (NMI) places with a population between 2,500 and 25,000 were studied. Each place was designated as growing, declining, or stable. Of the 118 growing and declining places, 52 grew and 66 declined. Correlation between growth and decline of Texas' NMI places and size of place and the geographic variables of urban influence, accessibility, and regional location were then examined. NMI places were further classified into regions, and regional growth patterns were examined using four declining and three growing regions. Findings were: (1) places remote from the Interstate Highway System tended to decline; (2) location in close proximity to a growing urban center favored growth; (3) places with relatively high proportions of their labor force engaged in manufacturing tended to grow, while those with agricultural and mining industries tended to decline. Using the three labor factors and two geographic factors, predictions for 1960-70 growth were made and then tested against actual changes. As prediction accuracy was 70 percent, predictions were also made for 1970-80. (JC)

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THE FUTURE OF NONMETROPOLITAN TOWNS IN TEXAS

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Presented at the annual meeting of the Rocky Mountain Social Science Association, El Paso, April, 1974

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THE FUTURE OF NONMETROPOLITAN TEXAS

Recently both nonmetropolitan and metropolitan areas have been foci of concern for researchers, planners, and policymakers, for differing although interrelated reasons. Nonmetropolitan towns are in general pictured as "losing out" to the metropolitan areas and gradually dying -- a cumulative effect of changes in agricultural technology which have reduced the demand for labor in agricultural areas, inability to attract industry because scale and agglomeration economies are not present, outmigration of young people due to lack of employment opportunities, and a resulting age structure heavily characterized by older persons. Metropolitan areas, on the other hand, are often viewed with alarm because of their accelerated rates of growth and resultant problems of congestion and overcrowding.

This paper will focus upon the nonmetropolitan areas of Texas, giving special attention to nonmetropolitan incorporated places. The overall purpose is to provide a "picture" of the future settlement pattern of nonmetropolitan Texas. Attention will thus be given to describing recent population changes, identifying probable causes of these changes, examining demographic and economic correlates of the changes, and evaluating the likelihood that recent trends will continue.

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DESCRIPTION OF RECENT CHANGES

The nonmetropolitan and metropolitan areas of Texas in 1970 are identified in Figure 1. Nonmetropolitan location refers to location outside the 40 counties designated as SMSA counties in 1970.[1] The nonmetropolitan population of Texas increased at a low rate from 1960 to 1970, following a slight decline during the 1950's. The number of people residing in nonmetropolitan areas, that is, the population in those areas classified in 1970 as nonmetropolitan, was 2,946,051 in 1950, 2,923,117 in 1960, and 2,962,272 in 1970.[2] The corresponding rates of population change for 1950 to 1960, 1960 to 1970, and 1950 to 1970 were -.8 per cent, 1.3 per cent, and .6 per cent respectively. Comparative rates for the metropolitan areas of the state were substantially higher: 39.7 per cent, 23.7 per cent, and 72.8 per cent.

Population changes from 1960 to 1970 in nonmetropolitan incorporated (NMI) places with a 1960 population between 2,500 and 25,000 are the primary concern of this research. There were 164 of these places in 1960. Their distribution by size class and growth performance is shown in Table 1.[3] Places were designated as either growing, i.e., experiencing a positive rate of change, or declining, i.e., experiencing a negative rate of change.

The computational procedures employed in the classification of growing and declining places, however, created some dissatisfaction.

FIGURE I **BEST COPY AVAILABLE**

METROPOLITAN AND NONMETROPOLITAN AREAS OF TEXAS IN 1970

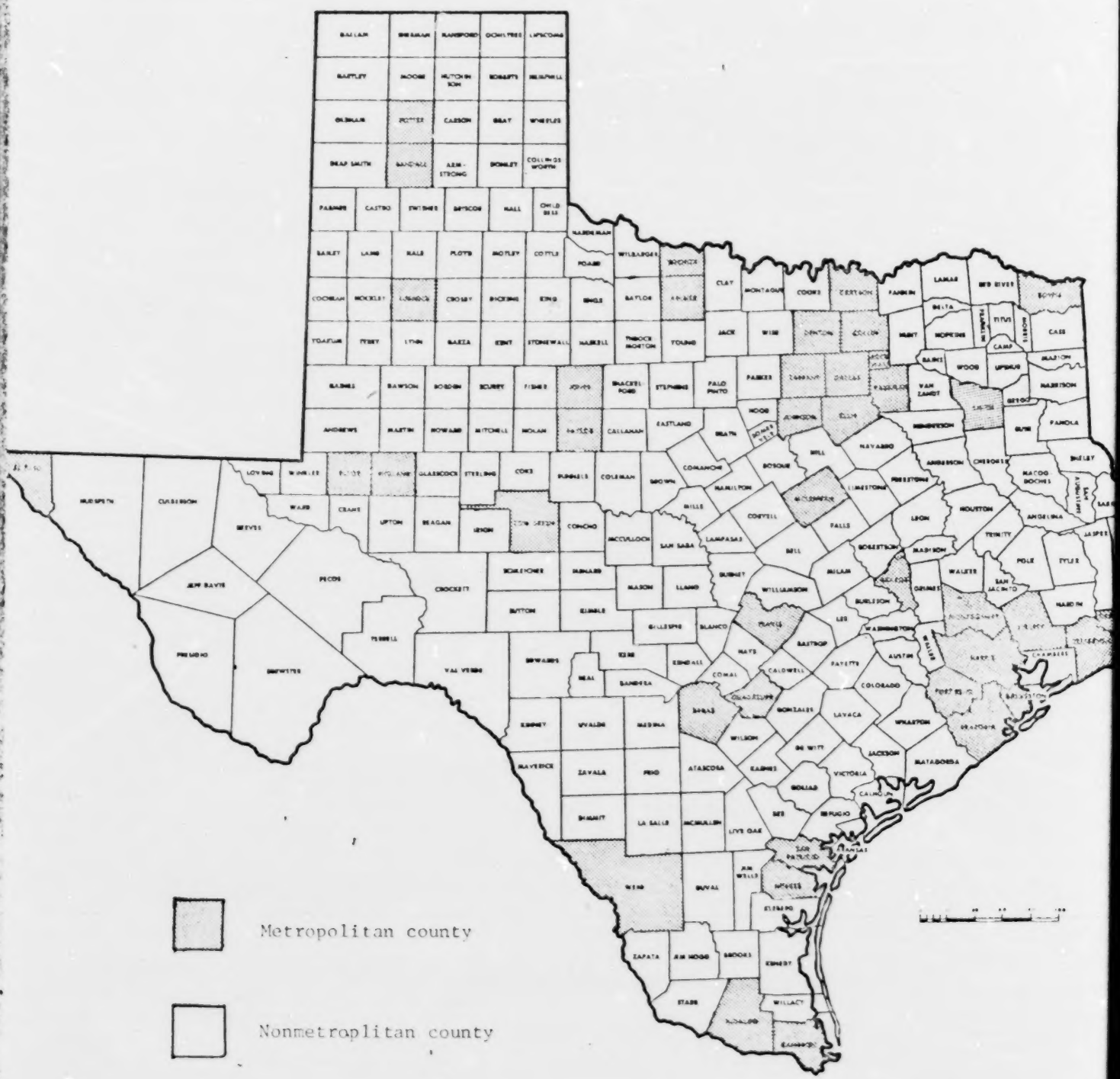

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TABLE 1

DISTRIBUTION OF NMI PLACES BY 1960-70 POPULATION CHANGE

Size of place in 1960	Number	Growing		Declining	
		No.	%	No.	%
2,500 - 4,999	80	37	46.2	43	53.8
5,000 - 7,499	33	16	48.5	17	51.5
7,500 - 9,999	18	13	72.2	5	27.8
10,000 - 14,999	20	10	50.0	10	50.0
15,000 - 24,499	13	8	61.5	5	38.5
All places	164	84	51.2	80	48.8

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Certain difficulties arising in connection with the computation of the rates of population change may be a source of distortion. Two problematic situations were identified; they are associated with (1) "borderline" growing and declining places which experienced very low rates of change and (2) "artificially" growing and declining places which had annexed land area over the time period. The former situation is universal and thus should be given attention by all researchers of city growth, whereas the latter is peculiar to cities located in states which have liberal annexation policies.

Many of the NMI places in Texas were "borderline" cases having very slight changes in population over the 1960-70 decade. Classifying these places as either growing or declining appears unsatisfactory. The obvious solution to this problem is the allocation of such places to a stable category. The solution, however, introduces the problem of selecting meaningul limits for the new category. If a place increased (decreased) at a rate of 1 per cent, should it be classified as stable or growing (declining)? What about a rate of 2 per cent? or 5 per cent? or 10 per cent? This problem was solved by arbitrarily designating 5 per cent as the cut-off point, such that all places which had positive rates which were less than 5 per cent and all places with negative rates less than -5 per cent were classified as stable.

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The distribution of NMI places, this time incorporating a stable category of population change, is shown in Table 2. The re-classification has resulted in the shifting of over one-fourth of the places previously designated as growing and declining to a stable category and thus yields a finer distinction between growth performances of places.

The second problematic situation, which deals with "artificial" change due to the effects of annexation, is also encountered in Texas. Annexation was very prevalent: 138 of the total 164 places increased in land area due to annexation over the period.

The effects of annexation vary and cannot be specifically determined on the basis of census data alone. However, speculations concerning potential effects can be made. In the case of a place which increased in population from 1960 to 1970 and also annexed land area over the time period, the reported population increase may in part consist of persons who resided in the annexed land for years prior to annexation. Such a reported increase differs in a qualitative sense from increase due to vital processes and inmigration and inflates the rate of population change. In the case of a place which lost population and also annexed land over the decade, the rate of decline may be understated for the same reason. That is, the loss in population due to natural decrease and/or outmigration may have been in part offset by the annexation of land containing persons who had resided there before annexation.

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TABLE 2

DISTRIBUTION OF NMI PLACES BY 1960-70 POPULATION CHANGE

Size of Place in 1960	Number	Growing		Declining		Stable	
		No.	%	No.	%	No.	%
2,500 - 4,999	80	26	32.5	30	37.5	24	30.0
5,000 - 7,499	33	12	36.4	10	30.3	11	33.3
7,500 - 9,999	18	11	61.1	3	16.7	4	22.2
10,000 - 14,999	20	7	35.0	8	40.0	5	25.0
15,000 - 24,999	13	6	46.1	2	15.4	5	38.5
All places	164	62	37.8	53	32.3	49	29.9

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This problem of distorted rates was tackled by computing another set of rates of population change for the NMI places. The second set considered the changes in population within only the 1960 area, from 1960 to 1970.[4] This method may also distort the rates of change, but the distortions are opposite from those produced by the first method. In this case, a rate of increase may be too conservative rather than overstated. It excludes migrants who settled in the annexed area after the date of annexation and children born to residents of the annexed area after the date of annexation. A rate of decrease computed by this method may be inflated, as it will consider residents who moved from the 1960 area to the annexed area to be outmigrants.

Each NMI place was again classified as growing, declining, or stable on the basis of two sets of rates of population change: one set was computed without taking account of annexation and the other considered only the change within the 1960 area. A place which had one positive rate of 5 per cent or higher combined with another positive rate was classified as growing. A place with one negative rate of at least -5 per cent and another negative rate was designated as declining. The remaining places, each of which had either both rates of change between -5 and 5 per cent or rates with opposite signs, were put in the stable category.

The results of employing this classification scheme are presented in Table 3. Comparison with Table 2 indicates that some

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TABLE 3

DISTRIBUTION OF NMI PLACES BY 1960-70 POPULATION CHANGE,

TAKING ACCOUNT OF ANNEXATION

Size of Place in 1960	Number	Growing		Declining		Stable	
		No.	%	No.	%	No.	%
2,500 - 4,999	80	25	31.2	36	45.0	19	23.8
5,000 - 7,499	33	8	24.2	13	39.4	12	36.4
7,500 - 9,999	18	8	44.4	5	27.8	5	27.8
10,000 - 14,999	20	5	25.0	9	45.0	6	30.0
15,000 - 24,999	13	6	46.1	3	23.1	4	30.8
All places	164	52	31.7	66	40.2	46	28.1

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shifts have occurred: 10 places previously designated as growing are now in the stable category whereas 13 stable places are now in the declining category. There was no distinct overall tendency towards growth or decline among the NMI places. Of the total 118 growing and declining places, 52 or 44 per cent grew and 66 or 56 per cent declined.

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INVESTIGATION OF THE ASSOCIATION BETWEEN SELECTED VARIABLES AND POPULATION CHANGE

A number of factors may be associated with population change. The relationship of growth and decline in Texas' NMI places to size of place and the geographic variables of urban influence, accessibility, and regional location, is examined here.

Size of Place

The relationship between size of place and population change is often hypothesized as a direct one: the larger the place, the more likely it is to grow. The theoretical basis is provided by central place theory.[5] The theory postulates a spatially optimum hierarchy of market centers, consisting of levels of centers which provide increasingly more specialized consumer goods. The market areas of the various levels of centers in the system interlock, so that consumers located in a small lower-level town will make frequent purchases of low-order goods in the small center, travel less frequently to a larger center for more specialized goods, and make rare trips to a high-level center for very specialized goods. The market area of the highest-level center in the hierarchy would thus encompass the market areas of all lower-level centers.

Modern changes in the hierarchy, due to factors such as transportation, highways, and the mechanization of agriculture, are expected to result in a thinning out of the central place

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pattern. As farm population declines and larger centers become more accessible, the high-level centers tend to expand their market areas at the expense of the relatively less important small centers at the bottom of the hierarchy. Therefore in a modern country, larger places are considered more likely to grow, and small places more often are expected to decline.[6]

The hypothesis may be examined by studying Table 3, in which growth performance by size class is presented. The results do not indicate that size of place is significantly associated with subsequent growth and decline. Smaller places appear somewhat more likely to decline than to grow, judging from an examination of the two smallest size classes. Larger places, however, do not demonstrate strong growth tendencies. Fewer than one-half of the places in the largest category grew, and nearly one-half of the places in the second largest class declined.

Distance to an SMSA Central City

Urban influence is another variable which may have an impact upon population change. Theoretically the farther a place is from a large urban center, the less the influence of the center on that place, and thus the more likely the place will lose population. A place located near a large center, on the other hand, is likely to have an economic link to the center; it may serve as a place of residence for people employed in the center, or it may attract activities away from the larger center by providing a more economical

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site due to lower land values, tax benefits, complementary activities, etc.

Empirical research has supported the hypothesis that a small place located near a large city is more likely to grow than a place located farther away from an urban center.[7] The applicability of the hypothesis to Texas was examined by differentiating NMI places according to whether or not they are within 50 miles of the nearest SMSA central city. The majority are located close to SMSA's; of the total 164 NMI places, 104 are located within and 60 outside of a 50-mile radius of an SMSA central city.

The results of the analysis are shown in Table 4. Only the growing and declining places are examined. The growth performances of places within the two distance classifications are strikingly similar: 33 or 44 per cent of the 75 places located within grew, and 19 or 44 per cent of the 43 places located outside grew. Examination by size class reveals some indication that for places located outside a 50-mile radius, decline is more prevalent among the smaller places and growth is more likely among the largest places. Apparently, however, urban influence as measured here had very little effect upon the growth performances of NMI places in Texas.

Distance to the Interstate Highway System

Accessibility is another geographic variable which may have an effect upon the growth performances of towns. The hypothesized relationship is a direct one; i.e., the more accessible a place is

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TABLE 4

DISTRIBUTION OF NMI GROWING AND DECLINING PLACES,

BY SIZE AND DISTANCE TO AN SMSA CENTRAL CITY

Size of Place in 1960	Within 50-mile Radius		Outside 50-mile Radius	
	Growing	Declining	Growing	Declining
2,500 - 4,999	18	20	7	16
5,000 - 7,499	4	8	4	5
7,500 - 9,999	5	3	3	2
10,000 - 14,999	3	8	2	1
15,000 - 24,999	3	3	3	0
All places	33	42	19	24

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the more likely it is to grow and vice versa. Places located near the system are at an advantage in terms of relative location over less accessible places. Their transportation costs involved in producing and distributing goods are lower, and their economic activities tend to be more successful as a result.

The road distance from each of the NMI places to the nearest major section of the interstate highway system in 1965 was calculated.[8] Since the interstate system was expanding over the 1960-70 decade, it was felt that distance to the system in 1965, at the middle of the period, was the best measure of accessibility.

Table 5 presents the results. Again only those places designated as growing and declining are analyzed. The results yield mixed evidence regarding the hypothesis. Places located within 50 miles of the interstate system are about evenly split between growth and decline: of the 54 places, 29 or 54 per cent grew. Places located more than 50 miles from the interstate system, however, exhibited a tendency to decline. Of the 64 places located outside, only 23 or 36 per cent grew while 64 per cent declined. Thus the less accessible a place is the more likely it is to decline, but not vice versa.

Regional Aspects

The places were also examined to see if there were regional patterns to growth and decline. It could be hypothesized that

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TABLE 5

DISTRIBUTION OF NMI GROWING AND DECLINING PLACES, BY SIZE AND DISTANCE TO THE INTERSTATE HIGHWAY SYSTEM

Size of Place in 1960	Within 50-mile Radius		Outside 50-mile Radius	
	Growing	Declining	Growing	Declining
2,500 - 4,999	13	12	12	24
5,000 - 7,499	5	7	3	6
7,500 - 9,999	4	1	4	4
10,000 - 14,999	3	3	2	6
15,000 - 24,999	4	2	2	1
All places	29	25	23	41

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places in close proximity are apt to share similar resources and tend to specialize in the same economic activities. As a result they are likely to have similar growth experiences, for a change in demand or a change in technology which affects production methods will probably affect all places in a similar fashion.

The NMI places were classified into regions, and regional growth performances were examined. The regions employed were State Planning Regions, consisting of clusters of from 2 to 25 counties.[9] The results of the analysis are shown in Table 6. A number of regions characterized by growth or decline can be distinguished. Places located in the Deep East Texas, North Central Texas, and Alamo regions tended to grow over the 1960-70 decade; places in the North Texas, West Central Texas, Permian Basin, and Concho Valley regions were more likely to decline.

Figure 2 is a map of the Texas Planning Regions which identifies the locations of the growing and declining regions. The spatial pattern of the declining regions is quite distinctive, taking the form of a wide band extending from the North to the Southwest. The three growing regions are scattered about the state but the distribution is not as random as it appears. The Deep East Texas region is adjacent to the Gulf Coast region, which contains Houston, the largest SMSA in the state. The three next largest SMSA's are located in the other growing regions: Dallas

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TABLE 6

DISTRIBUTION OF NMI PLACES BY 1960-70 POPULATION CHANGE, BY REGION

Region	Number of Places	Growing	Declining	Stable
Northeast Texas	7	4	2	1
East Texas	13	2	4	7
Brazos Valley	3	1	0	2
Deep East Texas	8	6	0	2
Gulf Coast	7	1	1	5
Golden Crescent	6	1	2	3
Coastal Bend	7	2	3	2
Lower Rio Grande	1	0	1	0
North Central Texas	10	6	1	3
Central Texas	12	3	4	5
Capitol	11	5	1	5
Panhandle	13	4	7	2
South Plains	10	2	4	4
North Texas	10	1	9	0
West Central Texas	12	1	10	1
Upper Rio Grande	2	1	1	0
Permian Basin	9	1	7	1
Concho Valley	6	0	5	1
Alamo	17	11	4	2

FIGURE 2

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TEXAS PLANNING REGIONS

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and Forth Worth are in the North Central Texas region and San Antonio is in the Alamo Planning Region.

The preceding analyses have provided direction for further analysis. Size of place and three geographic variables have been examined to see if they are interrelated with growth performance. The variable which appears to be most closely associated with population change is regional location. -In the next section, this will be examined in greater detail.

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ANALYSIS OF REGIONS

Examination of All Places

Overall rates of population change from 1960 to 1970 for the three growing and four declining regions were examined, in order to determine whether the pattern of population change in each region was similar to that experienced by its nonmetropolitan places.[10] The rates for the Deep East Texas, North Central Texas, and Alamo regions (the growing regions) were 12.7 per cent, 33.8 per cent, and 16.5 per cent respectively. Rates for the declining regions were as follows: North Texas, -5.6 per cent; West Central Texas, -9.1 per cent; Permian Basin, -5.8 per cent; and Concho Valley, -1.1 per cent. Apparently the growth performances of the NMI places in each region are representative of population changes for the region as a whole.

It was felt that it might be worthwhile to further investigate the degree to which the selected NMI places are representative of regional patterns of growth performance. If the hypothesis that places located in close proximity to each other are likely to demonstrate similar population change is correct, then the pattern of change experienced by the selected NMI places in each region should be common to all types and sizes of communities. Rates of population change from 1960 to 1970 for all other places located in the three growing and four declining regions were computed.[11] The other places, which were excluded from the original analysis,

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include metropolitan communities as well as NMI places with populations less than 2,500 and greater than 25,000 in 1960.

The results are shown in Table 7. The Deep East Texas Planning region contained no metropolitan communities but had 18 NMI places with fewer than 2,500 residents in 1960. These places showed the same tendency towards growth which was displayed by the larger NMI places previously examined. Both the smaller NMI as well as the metropolitan places in North Central Texas showed a striking pattern of growth over the decade, similar to the pattern displayed by the NMI places originally examined. The Alamo Planning Region, previously designated as growing, showed mixed tendencies. Metropolitan places grew, while the smaller NMI places were closely divided between growth and decline. Thus two of the three growing regions were characterized by growth in all types of communities while, in the third, growth was common to all but the smallest nonmetropolitan towns.

The other NMI places in the four declining regions showed the same pattern of decline as did the NMI places containing 1960 populations between 2,500 and 25,000. The North Texas and Permian Basin regions were characterized by metropolitan decline as well. The Concho Valley Planning Region contained only one metropolitan city -- San Angelo -- an SMSA central city which experienced a very moderate rate of increase over the decade.

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TABLE 7

DISTRIBUTION OF PLACES BY REGION

Region and Type of Place	Number of Places	Growing	Declining	Stable
Deep East Texas	18	13	2	3
Other NMI	18	13	2	3
Metropolitan	0	0	0	0
North Central Texas	167	139	10	18
Other NMI	41	28	8	5
Metropolitan	126	111	2	13
Alamo	42	21	14	7
Other NMI	27	9	11	7
Metropolitan	15	12	3	0
North Texas	16	4	9	3
Other NMI	9	2	4	3
Metropolitan	7	2	5	0
West Central Texas	45	14	24	7
Other NMI	34	9	19	6
Metropolitan	11	5	5	1
Permian Basin	15	1	12	2
Other NMI	12	1	10	1
Metropolitan	3	0	2	1
Concho Valley	12	3	8	1
Othern NMI	11	2	8	1
Metropolitan	1	1	0	0

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Metropolitan communities in West Central Texas deviated from the regional pattern, as they were evenly split between growth and decline. All five of the declining towns in this region contained fewer than 1,000 residents and were located in Taylor County, the central county of the Abilene SMSA. The city of Abilene decreased very slightly during the 1960's and was classified as stable. In general, the four declining regions were characterized by decline of other places as well as of NMI places over the decade.

Causes of Regional Patterns

Quite distinct regional patterns of population change have been identified. This suggests that places within the regions were similar in structure and function and as a result responded in the same way to factors affecting their major economic activities. Identification of these factors is of primary concern.

Urban influence. The close proximities of the growing regions to the largest metropolitan centers in the state suggest that the previous finding that urban influence did not affect growth is incorrect. Urban influence was previously measured by simply distinguishing whether a place was located within or outside of a 50-mile radius of an SMSA central city. This measure gives equal weight to all SMSA's, regardless of size and recent growth performance. Yet Texas' 24 SMSA's ranged in size in 1970 from 57,978 to 1,555,950 and varied in growth over the 1960-70 decade

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from a 7.1 per cent decrease to a 40 per cent increase.[12] It appears likely that the degree and extent of influence exerted by the SMSA's over their surrounding areas also varied considerably, and that the simple measure employed earlier is inadequate.

A better measure of urban influence should be employed -- one which takes account of the sizes and perhaps the recent growth performances of the large urban centers. The construction of such a measure is not undertaken here, but the urban influence variable will be re-examined for the regions in light of the preceding discussion.

For each region, distances in road miles in 1965 from the NMI places to the central city of the largest SMSA in the region were computed. The results of examining these distances and the growth performances of the NMI places in the growing regions were as follows. The Deep East Texas region contains no SMSA but is adjacent to the region in which Houston, the largest of Texas' SMSA's, is located. However, none of the NMI places in the region are in close proximity to Houston; the majority are considerably more than 60 miles distant from Houston. Thus it appears that the growth in this region must have been due to factors other than urban influence. The NMI places in North Central Texas, on the other hand, appear to have been considerably influenced by proximity to large urban centers. Two of the largest SMSAs in the state -- Dallas and Fort Worth -- are located in this region.

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Dallas had a 1960 population of over 1 million and grew at a rate of 39 per cent over the 1960-70 decade; Forth Worth had over 570,000 persons in 1960 and grew 33 per cent over the ensuing decade. All of the 10 NMI places within the region were located within 65 miles of either Dallas or Forth Worth, and all but one of these places grew or was stable from 1960 to 1970. Similar evidence of a beneficial effect resulting from proximity to a large and growing urban center was found for the NMI places in the Alamo region. San Antonio, the third largest SMSA in 1960, is located in this region. San Antonio had a population of 716,000 in 1960 and grew 20.6 per cent during the 1960 decade. All of the NMI places located within 60 miles of the San Antonio city limits grew during the 1960's. The four declining places as well as the two stable places in the region were more distant than 60 miles. Three places located further than 60 miles grew; however, two of these were located on the United States-Mexico border and thus were subject to unique growth-inducing effects which might well outweigh any disadvantage associated with remoteness from large urban centers.[13]

The results of examining the effect of urban influence upon population change in the four declining regions differed from those for the growing regions. The SMSA's in the declining regions were much smaller than those in the growing regions and their rates of population change over the 1960-70 decade were considerably lower,

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in most cases negative. The North Texas region contains the Wichita Falls SMSA. Wichita Falls had a 1960 population of just under 130,000 and declined 1.6 per cent from 1960 to 1970. The NMI places in the region were located at a wide range of distances from Wichita Falls, varying from 17 to 105 miles, but showed little variation in growth performance. All places but one declined from 1960 to 1970. The same pattern was found in the Concho Valley region, which contains the San Angelo SMSA. The NMI places varied in distance from San Angelo but did not vary in growth performance: one place was stable and all the others declined. San Angelo grew at a rate of 9.9 per cent over the 1960-70 decade but was one of the smallest SMSA's in Texas with a population of less than 65,000 in 1960.

The West Central Texas region contains the Abilene SMSA. Abilene had slightly over 120,000 people in 1960 but declined 5.3 per cent from 1960 to 1970. All NMI places located within 72 miles of Abilene declined. Of the two places located further than 72 miles, one was stable and the most distant one grew. The Permian Basin had a very similar pattern. Two SMSA's are in the region: Odessa which had a 1960 population of 91,000 and a 1960-70 increase of .9 per cent, and Midland which had only 67,700 persons in 1960 and declined by 3.4 per cent between 1960 and 1970.[14] All of the NMI places which were located within 65 miles of Midland or Odessa declined over the recent decade, and

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of the two located more than 65 miles away, the most distant place grew and the second most distant was stable.

The results of the preceding examination suggest a number of interesting questions concerning the effects of urban influence. For example, does the degree of influence exerted by urban centers vary with their sizes? And if influence does vary with size, in what ways does it vary, i.e., degree or areal extent or both? Also, does the recent growth performance of an urban center affect the direction and/or degree and/or extent of influence exerted by that center? Might a declining center exert a negative influence such that smaller nearby towns also tend to decline?

The analysis merely posed the above questions; no conclusions can be made concerning them. It definitely appears, however, that urban influence should not be dismissed as an explanatory variable in studies of population change of small towns. Indeed, it seems reasonable that in the cases of the North Central Texas and Alamo regions in Texas, the influence of a very large and fairly rapidly growing urban center was a major factor affecting the growth of nearby smaller places.

Regional specializations. Urban influence has been specified as a possible factor affecting change in two of the growing regions. Identification of other factors is necessary. It has previously been suggested that places within the same region are likely to have

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similar growth experiences, as they tend to specialize in similar economic activities and respond in the same manner to factors affecting these activities. Support was provided for this hypothesis by the finding that all types of communities within each of the selected regions tended to experience similar patterns of population change from 1960 to 1970. Thus it appears that identification of the specialized activities of the places within each of the regions is necessary in order to understand the causes of the regional patterns of population change.

Industrial employment data in 1960 for the NMI places located within each of the growing and declining regions were examined.[15] All industrial categories were considered but interest was primarily focused upon the percentages of the labor force engaged in agricultural, mining, and manufacturing activities. Table 8 lists "activities of specialization" for the regions. An activity was designated as an activity of specialization if, for the NMI places within the region, the average rate of labor force participation in the industry was higher than the corresponding rate for the state as a whole. Texas had only 8.3 per cent of its total labor force employed in agriculture in 1960; the NMI places within the regions shown in Table 8 as specializing in agriculture had an average of at least 9 per cent of their labor forces employed in agriculture. The per cent of Texas' labor force employed

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in mining in 1960 was only 3.0 per cent, while the averages for the places within the regions designated as specializing in mining ranged from 6.6 per cent to 21.7 per cent. The two regions for which manufacturing is shown as a specialized activity had averages of 20.6 and 16.9 per cent, slightly higher than the state's rate of 16.2 per cent and considerably higher than the averages for any of the other regions.

In general the growing and declining regions specialized in different activities, as can be seen in Table 8. The fact that the growing regions tended to specialize in manufacturing is not particularly surprising, as manufacturing has been a growth industry in the United States, increasing absolutely in terms of output and employment over the last several decades. More unexpected is the association between declining regions and mining activity. Most often population loss in nonmetropolitan areas is linked to changes in agricultural organization and technology. However, the mining industry shared the same experiences as agriculture in the United States over recent decades; both have been steadily declining in terms of employment although growing in terms of output and output per man.[16] This will be further explored in the more detailed examination of the growing and declining regions which follows.

Two of the growing regions, Deep East Texas and North Central Texas, had relatively high proportions of the labor forces of their NMI places engaged in manufacturing activity in 1960. Output in

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TABLE 8

INDUSTRIAL ACTIVITIES OF NMI PLACES BY REGION, 1960

Region	Activity of Specialization
Deep East Texas	Manufacturing
North Central Texas	Manufacturing
Alamo	Agriculture
North Texas	Mining
West Central Texas	Mining
Permian Basin	Mining
Concho Valley	Agriculture, Mining

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manufacturing has expanded rapidly in the United States since about 1930. This expansion was accompanied by a rapid growth in manufacturing employment until the mid-1950's, after which employment became relatively stable.[17] In Texas, on the other hand, manufacturing activity and employment grew more slowly in the early part of the century and continued to increase throughout the 1950's and 1960's. Thus the prospect for continued growth of manufacturing activities and employment in Texas in 1960 was substantial and particularly favorable in areas which already had a fair amount of manufacturing activity. That is, already existing firms would be likely to expand and provide additional employment opportunities, and new manufacturing firms would tend to be attracted by the supply of skills and supporting services, transport facilities, and social and business climate offered in these manufacturing areas and thus locate there. The prospect for population growth in these areas would likewise be favorable because, as manufacturing activity and employment grows, job opportunities in not only manufacturing but also related industries and supporting services should grow. Thus these areas would tend to attract inmigrants seeking employment and also tend to retain their own young people who are just entering the job market.

The growth in these two regions is thus attributed to their economic base structures in 1960. Each had relatively high employment in a viable and expanding industry at the beginning of the period, and subsequent growth is hypothesized to be the result of growth

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in manufacturing activity and accompanying increases in related activities. Employment statistics for the NMI places in Deep East Texas and North Central Texas were briefly examined to see if this explanation is reasonable.[18] For the majority of the places within both of the regions, manufacturing employment increased substantially over the 1960 decade. And, the absolute increase in manufacturing employment was less than the absolute increase in the employed labor force from 1960 to 1970, which indicates that other industries were likewise providing additional jobs during the period. Thus the explanation offered for the growth in these two manufacturing regions seems reasonable.

The Alamo region's 1960-70 growth cannot be explained on the basis of the region's activity of specialization in 1960, which was agriculture. General population decline in agricultural areas is a well-documented phenomenon in the United States in recent decades. The decline is attributed to outmigration from such areas in response to a reduction in the supply of employment opportunities as agriculture has become more mechanized and more capital intensive. Thus in the United States, although agricultural output has been increasing, employment has been steadily declining throughout the last few decades. This statement is also true for Texas. In 1940 almost one out of every three Texans in the labor force was employed in the agriculture, forestry, and fisheries sector; by 1960 the ratio was less than one in ten and by 1970 it had dropped to less

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than one in twenty.[19] The absolute decrease in employment in this sector in Texas from 1960 to 1970 was 109,448 persons, a relative decline of 37.5 per cent.[20] Thus there is reason to expect that an agricultural area in Texas in 1960 would have lost population during the 1960-70 decade, due to its failure to provide enough job opportunities to retain its own population and/or attract job-seeking inmigrants.

The above expectation was not realized for the Alamo region. The majority of places within this region gained population from 1960 to 1970. Several explanations for this situation may be offered. One possibility is that the region was unique and employment in agriculture increased rather than declined after 1960. Estimates of the 1960-70 changes in agricultural employment for the NMI places within the Alamo region, however, indicate that this was not the case. The actual 1960-70 changes in agricultural employment cannot be determined, since in 1970 the census reported the number employed in agriculture for places with populations less than 10,000 as part of the "other industry" category rather than separately as in 1960. Estimates were derived by first computing the 1960-70 percentage changes in employment in the agriculture, forestry, and fisheries sector for the counties in which the NMI places are located (the data was reported on a county basis in both 1960 and 1970) and then multiplying the number of employees in 1960 in this sector in each NMI place by the corresponding 1960-70 county rate of change.[21]

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The result was an estimate for each NMI place of the change over the 1960-70 decade in the number of persons employed in the agriculture, forestry, and fisheries sector. This estimated change was negative for each of the NMI places, indicating declining agricultural employment. The decreases in employment ranged from 2 per cent to 53 per cent; the majority of places had losses greater than 35 per cent. Thus the Alamo region was not unique but rather experienced the same pattern of declining employment in agriculture as did the United States and Texas.

Another explanation for the region's growth relates back to the results of the re-examination of urban influence, which suggested that urban influence was a factor affecting the growth of the region. The benefits accruing to places in the region due to proximity to San Antonio may have offset the negative effect of declining agricultural employment. For example, business establishments located within San Antonio may have provided alternate employment opportunities for residents of those places within commuting distance. Or, as part of a decentralization process, manufacturing firms originally located in San Antonio may have moved part or all of their operations out to surrounding towns, thus providing an additional and expanding supply of jobs in these places. Both of these possibilities were examined and the results are discussed below.

Commuting data is not available for places with populations of less than 10,000, but it is available for counties. The county

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data was thus employed as a surrogate.[22] Only a few of the places are located in counties with a relatively large amount of commuting to Bexar County, the county in which San Antonio is located. In fact, only 5 of the 17 NMI places are located in counties in which more than 5 per cent of the employed labor force commuted to Bexar County in 1970, and for none of these counties was the per cent greater than 25 per cent. Therefore although the alternate supply of jobs available in San Antonio may have been a factor offsetting agricultural employment decline in some of the NMI places in the region, it had a negligible effect upon the growth of the majority of the places.

Employment statistics for the NMI places in the Alamo region in 1960 and 1970 lend weight to the possibility that growth was the result of decentralization of San Antonio manufacturing establishments.[23] In the majority of NMI places the number of manufacturing employees increased substantially over the decade. The sizes of the increases indicate that not only did the few existing firms expand but also that new firms must have located in these places. Only 4 of the 17 places showed decreases in manufacturing employment; these decreases were slight, and 2 of the 4 places lost population while one was stable over the decade. The absolute increases in manufacturing employees of the other 13 places were compared to the estimated losses of employees in the agriculture, forestry, and fisheries sector which were previously computed. If the hypothesis that the additional supply of jobs in manufacturing offset

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the losses from declining agricultural employment is correct, then the absolute changes in manufacturing employees should exceed the estimated losses of agricultural employees in the places. This was found to be correct. Nine of the 13 places with manufacturing employment increases had manufacturing increases in excess of estimated agricultural losses; the increases in manufacturing employees for these 9 places ranged from 101 per cent to 2,352 per cent of the estimated losses of agricultural employees. Two of the four remaining places which had manufacturing increases which were less than the agricultural losses were places which lost population over the 1960-70 decade. Thus it appears that the Alamo region grew not as a result of its activity of specialization in 1960 but rather because of its proximity to a large, growing urban center -- which enabled it to attract a new growing industry to replace its declining activity.

The four declining regions -- North Texas, West Central Texas, Permian Basin, and Concho Valley -- all had relatively high proportions of the labor forces of their NMI places engaged in mining activities. It has already been mentioned that the mining industry in the United States has shown a pattern of output and employment change similar to agriculture in recent decades. Output and output per man have been increasing while employment has been declining. The causes of the decrease in mining employment are similar to those affecting agricultural employment: technological innovations, increasing efficiency, and a shift to more capital rather than labor

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intensive operations. The mining industry in Texas has been similarly affected. Output has been steadily increasing while employment has been decreasing. The most important products of the mining sector in Texas are petroleum, natural gas, and natural gas liquids. Texas led the Nation in output of these products in both 1960 and 1970.[24] Petroleum and natural gas employment accounted for 94 per cent of the mining sector in 1960.[25] Employment decreased from 1960 to 1970, with an absolute decrease of 1,771 persons and a relative decrease of 1.8 per cent.[26] Thus the population loss from 1960 to 1970 in the regions which had a fair amount of mining employment might have been predicted.

Petroleum was the most important mineral in all four of the regions in 1960, with natural gas and natural gas liquids vying for second place.[27] Rates of decline in mining employment from 1960 to 1970 cannot be computed, since mining employment was not reported as a separate industrial category for places with populations less than 10,000 in the 1970 census. Using the county rates of change as surrogate measures, however, indicates that the majority of the places had substantial decreases in mining employment during the recent decade.[28] The highest rates of decline occurred in the NMI places in North Texas, where losses averaged 51 per cent of the number employed in mining in 1960. Places in the West Central Texas and Concho Valley regions had average losses of 41 per cent and 39 per cent respectively. The Permian Basin region was an exception;

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its NMI places did not suffer large losses and nearly half had increases rather than losses in the number engaged in mining from 1960 to 1970.

The population losses of places in three of the declining regions may thus be hypothesized as being related to loss of jobs in the mining sector. The feasibility of this hypothesis was examined by comparing the estimated loss of population in each place due to declining mining employment with the decrease for each place reported by the census.[29] The two figures should be of roughly similar magnitudes if the reduction of jobs in the mining sector was the major cause of population decline. The loss of population due to mining decline was estimated by first computing the estimated absolute 1960-70 decrease in mining employees for each NMI place. This was done by multiplying the number engaged in mining in 1960 by the rate of decline in mining employment over the 1960 decade for the county in which each place is located.[30] The resulting number for each place was multiplied by the number of persons per household figure for that place in 1960 to give an estimate of the total number of persons who left due to job losses in mining.[31] The assumption was made that each employee lost from the mining industry entailed a population loss from the NMI place of one household.

Comparison of the estimated and actual population losses for the NMI places in each region indicated that for only one region,

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North Texas, was a substantial amount of the actual population loss accounted for by the estimated loss related to mining decline. This appears to indicate that other industries in these regions may have also experienced substantial employment decreases from 1960 to 1970. This possibility was explored for each of the regions.[32]

The substantial decreases in mining employment in the NMI places in North Texas were accompanied by sizeable decreases in employment in the construction and retail trade industries. As mentioned previously, the estimated population losses due to mining decline were for the majority of places almost as large as the actual population losses. The small decreases in trade and even smaller decreases in construction employment account for the unexplained losses. It appears logical to relate the decline in trade to the mining decline, as outmigration of mining employees who have lost their jobs would reduce the demand for retail goods, which would in turn reduce the number of retail employees needed to serve the community. The decreases in construction are related to the mining and trade decline, as construction activity would logically decline in a community which is losing population. This explanation of the population losses in the North Texas region is speculative and cannot be proved but appears logical on the basis of the available evidence.

Mining-related population losses in the NMI places in the West Central Texas and Concho Valley regions only accounted for small

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proportions of the absolute losses over the 1960-70 decade. These losses were accompanied by losses in nearly all other industries -- with retail trade, financial services, and construction accounting for the largest decreases in numbers of employees. Again it may be speculated that the overall population losses of these NMI places are the result of the decreases in mining jobs, since mining employment is not dependent upon community population size and in fact directly affects size whereas employment in most of the other industries is dependent upon the population size of each community and therefore dependent upon mining employment. That is, mining is a primary activity and is mainly distributed in accordance with the location of its resource while trade, services, and construction are secondary activities whose locations are determined by demands generated by community populations. Thus a decline in mining employment may have a "snowball" effect upon secondary activities but the reverse is unlikely.

The Permian Basin differed from the other declining regions in that losses in mining employment in its NMI places were in many cases minimal and, in 4 of the 9 places, mining employment increased rather than decreased. The other industries in these places however had substantial declines in employment over the recent decade -- with the largest decreases occurring in manufacturing, retail trade, construction, and financial services. The overall population losses cannot be attributed to mining losses alone, as these losses were slight

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in most places. However, the combined employment losses in the "basic" activities -- mining and manufacturing -- were fairly large and could have induced declines in the other "nonbasic" or service-type activities. But it is unclear why all of the NMI places in the region, with the exception of one place which grew and one which was stable, experienced losses in manufacturing over the recent decade. Manufacturing was a growing industry which provided many new jobs in most areas of the state during the 1960's, and it is not readily apparent why manufacturing activity in the Permian Basin did not also expand. A re-examination of the locations of the NMI places in this region does, however, suggest a possible explanation. All of the places were fairly distant from the Interstate Highway System in 1965: only one was within 60 miles of the system and the majority were more than 90 miles away. Manufacturing activities in these places may have declined as a result of the relatively high production and distribution costs generally associated with inaccessible locations. Thus it is suggested that the population losses of the NMI places in the Permian Basin were a result of declining employment in the "basic" mining and manufacturing industries.

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PREDICTING GROWTH AND DECLINE

The previous analyses have identified a number of variables which have had an effect upon the growth and decline of NMI places in Texas. Specifically, the findings indicate that:

(1) Places remote from the Interstate Highway System tended to decline. The critical distance from the System, which defines inaccessibility, is approximately 50 miles.

(2) Location in close proximity to a large and growing urban center favored growth. The beneficial aspects of urban influence appear to extend to places located within 60 miles of the urban center.

(3) Places with relatively high proportions of their labor forces engaged in manufacturing activities tended to grow.

(4) Places with relatively high amounts of agricultural activity were more likely to decline.

(5) Places with relatively high proportions of their labor forces employed in the mining industry tended to decline.

These findings should be useful in formulating a method for predicting future population changes in nonmetropolitan Texas. In the following sections such a forecasting method is described, tested by predicting the 1960-70 changes for the NMI places of Texas in 1960, and then applied to Texas' NMI places in 1970.

Predicting 1960-70 Changes

Five factors, which were mentioned in the introduction to this section, were found to have effects upon the growth and decline

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of NMI places in Texas. Three of these are related to labor force characteristics and the other two are geographic. As a first step in formulating a method to predict 1960-70 changes, the five factors were operationalized as follows:

(1) Greater than 3 per cent of the labor force of the county employed in the mining sector in 1960

(2) Greater than 30 per cent of the labor force of the county employed in the agriculture, forestry, and fisheries sector in 1960

(3) Location more than 50 miles from the Interstate Highway System in 1965

(4) Greater than 16.2 per cent of the labor force of the place employed in the manufacturing sector in 1960

(5) Location within 60 miles of one of the four largest SMSA's in Texas in 1960

The presence in an NMI place of any of the first three factors listed above is hypothesized to be related to subsequent decline, while the presence of either of the last two should be related to subsequent growth. The factors are discussed below.

The regional analyses demonstrated that places with relatively high amounts of mining employment tended to decline. Since the entire state had 3 per cent of its labor force employed in the mining sector in 1960, a value of greater than 3 per cent should indicate a relative concentration in mining. Employment statistics for the counties in which the places are located are employed even

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though the data is available for the places. This was done because this 1960 model is to serve as a prototype for the 1970 model and, in 1970, mining employment data for counties must be used because it is not available for places with populations less than 10,000.

A relatively high proportion of employment in the agriculture, forestry, and fisheries sector was also hypothesized to lead to decline of places. County data is again employed because such data is not available for places in 1970. The proportion of Texas' labor force employed in this sector was 8.8 per cent in 1960; therefore a place with a higher proportion had a relative concentration in this activity. Nearly all of the nonmetropolitan counties, however, had more than 9 per cent of their labor forces employed in this sector, since nearly all of the state's farming activities are located in nonmetropolitan areas. Thus a higher critical per cent is needed in order to distinguish places with high agricultural employment when using county statistics as surrogate measures. A re-examination of the places which had more than 8.8 per cent of their labor forces employed in the agriculture, forestry, and fisheries sector in 1960 showed that, in nearly every case, the county in which the place is located had a corresponding per cent which was greater than 30. Thus 30 per cent was selected as the critical value.

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Places which were located more than 50 miles from the Interstate Highway System in 1965 showed a tendency to decline from 1960 to 1970. Thus this factor is included in the model. A statement about places located within 50 miles is not included in the model, however, since the results of the analysis of accessibility indicated that such places were evenly split between growth and decline.

Places which had relatively high percentages of their labor forces engaged in manufacturing activities in 1960 tended to grow over the subsequent decade. Texas had 16.2 per cent of its labor force employed in manufacturing in 1960; therefore a place with more than 16.2 per cent is considered to have a relative concentration of manufacturing activity and is thus expected to grow. Place statistics rather than county surrogates are employed for this factor because, in 1970, manufacturing employment data is available for places.

The regional analyses also indicated that close proximity of a place to a large and growing urban center tended to favor subsequent growth. Sixty miles from the center appeared to be an appropriate measure of the necessary proximity. There were only four SMSA's in Texas in 1960 which had populations greater than 500,000. The four central cities -- Dallas, Fort Worth, Houston, San Antonio -- were selected as the urban centers most likely to

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exert a positive influence upon smaller places.

Predictions of the 1960-70 population changes for each of the 164 MI places in Texas in 1960 were derived as follows. For each place the factors which were present were noted. Thus a place could have from 0 to 5 factors. The first three factors were considered indicators of decline and the last two indicators of growth. If a place had more "decline" factors than "growth" factors it was predicted to decline, and if it had more "growth" than "decline" factors it was predicted to grow. Thus a place with all five factors present would be expected to decline, as it would have three "decline" factors and only two "growth" factors. And,a place with manufacturing (growth), mining (decline), and urban influence (growth) factors would be predicted to grow.

Obviously, predictions could not be derived on this basis for all of the places; those with equal numbers of "growth" and "decline" factors and those with no factors present are left unassigned. A method of weighting the factors appears useful in deriving predictions for places with ties. Since the two geographic factors, inaccessibility and urban influence, appeared to be the strongest indicators in the earlier analyses, they were given extra weight in the case of ties. For example, a place having only the manufacturing (growth) and inaccessibility (decline) factors was predicted to decline, while a place with agriculture (decline) and urban influence (growth) was predicted to grow. The remaining

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places for which predictions could not be made; i.e., those with no factors present and those with ties involving only the labor force factors, were given the same predictions as the places in closest geographic proximity to them. This appears logical in light of the earlier finding that regions tend to share the same pattern of population change.

The accuracy of the predictions was tested by comparing the predicted changes to the actual 1960-70 changes. The results are summarized in Table 9. The first category of places for which results are given include those places which were classified as growing or declining on the basis of examining two rates of change -- one rate computed without taking into account the effects of annexation and the other considering only the change within the 1960 area. The two rates had to have the same sign and one had to be at least 5 or -5 per cent in order for a place to be classified as growing or declining. The accuracy of the predictions for these places was 73 per cent.

The second category of places in Table 9 includes those which were classified as stable, i.e., both rates of change were between -5 and 5 per cent, for which the direction of change could be determined. That is, both rates were either small and positive or small and negative. Of the 29 places falling into this category, the direction of change for 17 was predicted correctly. The third category of places

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TABLE 9

COMPARISON OF PREDICTED TO ACTUAL 1960-70 CHANGES IN NMI PLACES

	Number		Per Cent
Places which grew or declined	118		100.0
Correct prediction		86	72.9
Incorrect prediction		32	27.1
Places which were stable, with direction of change determinable	28		100.0
Correct prediction		17	60.7
Incorrect prediction		11	39.3
Places which were stable, with direction of change not determinable	18		
Total	164		
Places which grew or declined plus stable places with direction of change determinable	146		100.0
Correct prediction		103	70.5
Incorrect prediction		43	29.5

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is comprised of 18 stable places having rates of change with opposite signs and for which the actual direction of change could not be determined. The final panel of the table contains the combined results of the comparisons of actual and predicted changes of all the places for which actual directions of change could be determined. The accuracy of the predictions for these places was slightly over 70 per cent. Thus the forecasting method resulted in a fairly high proportion of correct predictions of change over the 1960-70 decade.

Changes for the NMI places were also predicted on the basis of past changes to provide a means for evaluating these results. Performances of the places over the 1950-60 decade were determined and then used as predictions for the 1960-70 period. When compared with the actual performances, only 56 percent of the predictions for the places for which the direction of change could be determined were accurate -- considerably lower than the 70 per cent accuracy of the prediction method presented earlier. In the next section the basic model which was constructed earlier is used to predict 1970-80 population changes for NMI places in Texas.

Predicting Future Changes

Before applying the 1960 model to 1970 data, the likelihood that the same factors which affected population change from 1960 to 1970 must be analyzed. That is, will mining and agricultural employment continue to contract and induce decline in places which have relatively high concentrations of these activities? Will manufactur-

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ing employment continue to expand and induce growth? Will geographic location continue to have an impact upon population change in the future? These questions are examined below.

An indication of the likelihood that the three labor force factors will still be operative after 1970 is provided by comparing the proportions of Texas' labor force engaged in the three activities in 1970 to comparable proportions for the United States. Historically Texas has experienced the same movement of labor out of the primary (e.g., mining and agriculture) industries and into the secondary (manufacturing) and tertiary (services) industries as has the nation as a whole, but the transformation of Texas' labor force has lagged behind that of the nation's. Thus if the 1970 allocation of workers by industry in Texas differed from that of the nation, there is reason to expect that the industrial composition of Texas' labor force will continue to change in the direction of convergence with the nation. On the other hand, if the industrial allocations in Texas and the United States were very similar in 1970, there is no evidence that past trends of change in the industrial composition of Texas' labor force will continue.

In 1970, the proportions of the labor force of Texas employed in the agriculture, forestry, and fisheries sector, in the mining sector, and in the manufacturing sector were 4.4 per cent, 2.4 per cent, and 17.4 per cent respectively. Corresponding proportions for the United States labor force were 3.5 per cent, .8 per cent, and 24.4 per cent.[32] The industrial allocations are dissimilar; Texas had

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higher proportions of its labor force employed in agriculture and mining and a lower proportion employed in manufacturing than did the nation as a whole. Thus Texas may be expected to move towards convergence, i.e., mining and agricultural employment are expected to continue to decline during the 1970's and manufacturing employment will probably continue to increase.

There is no reason to suspect that the two geographic variables will not continue to affect growth and decline of NMI places in the future. The relative importance of these factors however could change. For example, when the Interstate Highway System is complete, there will be few places in Texas located more than 50 miles from the System. With only a small number of inaccessible places, inaccessibility will be much less useful in explaining or predicting population change. However, the Interstate System was not complete in 1974 and many places were still inaccessible, so the factor should continue to be important during the 1970's. Urban influence may likewise become a less important factor in the future as a result of transportation improvements. As transportation networks become denser places become more accessible to each other, and the larger urban centers are able to exert influence over a greater number of small towns. And, if Texas' intermediate-size SMSA's continue to grow, there will be a greater number of large urban centers in the state. Eventually the majority of small towns may lie within the ranges of influence of the largest urban centers. Location in close proximity to a large urban center will not in this case be a valuable characteristic for distinguishing growing from declining places. However, this situation has not yet occurred in Texas, and urban influence should continue to affect population change during the 1970's.

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Since the factors which affected population changes in NMI places in Texas during the 1960's are likely to remain operative during the 1970's, the basic 1960 forecasting model, with only a few alterations, may be applied in 1970. The five factors were operationalized as follows:

(1) Greater than 2.4 per cent of the labor force of the county employed in the mining sector in 1970

(2) Greater than 25 per cent of the labor force of the county employed in the agriculture, forestry, and fisheries sector in 1970

(3) Location more than 50 miles from the Interstate Highway System in 1974

(4) Greater than 17.4 per cent of the labor force of the place employed in the manufacturing sector in 1970

(5) Location within 60 miles of one of the four largest SMSA's in Texas in 1970

The only changes in this model from the 1960 model involve the years for which the data were collected -- one decade later -- and the critical percentage values of the three labor force factors. In the case of the mining and manufacturing factors, the percentages of Texas' labor force employed in each of the two sectors in 1970 were substituted for the corresponding 1960 percentages. Since the critical per cent which indicated a relatively high proportion of agricultural activity was estimated to be 30 per cent in 1960 and agricultural employment declined from 1960 to 1970, this value was reduced to 25 per cent. Again in 1970 there were only four SMSA's in Texas with populations

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greater than 500,000 and their central cities -- Dallas, Fort Worth, Houston, San Antonio -- were selected as the urban centers most likely to exert a positive influence upon smaller places during the 1970's.

The methodology employed to predict 1960-70 changes was again employed to predict 1970-80 population changes for the NMI places. There were 172 NMI places in Texas with populations between 2,500 and 25,000 in 1970. For each place the factors which were present were noted, and a place was predicted to grow if it had more "growth" than "decline" factors and to decline if it had a majority of "decline" factors. Ties were broken by giving additional weight to the two geographic factors, and the remaining unassigned places were given the same predictions as those NMI places in closest proximity to them.

The locations of the 172 places and their predicted changes from 1970 to 1980 are shown in Figure 3. Growth was predicted for 80 of the places and 92 places were predicted to decline. There is a distinctive spatial pattern to the predictions, as can be seen from Figure 3. Most of the places for which growth is predicted are located in the central and northeast portions of the state, while the majority of places predicted to decline lie in the west and southwest.

Implications

Policies for influencing future population trends require as a basis an understanding of the current situation and some idea

FIGURE 3

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PREDICTIONS OF POPULATION CHANGE FOR NMI PLACES, 1970-80

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of the distribution which is likely to evolve without planned intervention. This study has attempted to provide such a basis. Currently attention is being focused upon declining nonmetropolitan towns and congested metropolitan cities. Thus small nonmetropolitan towns which are growing or are predicted to grow are not of prime concern to policymakers. Yet knowledge of which places are likely to grow in the future can be a valuable aid in planning. Identification of places which will probably experience growth indicates the areas of the state in which increased demands for public services, e.g., highway maintenance and expansion, public schools, medical facilities, may be expected.

Small nonmetropolitan towns which are declining or are likely to decline are of major interest to those concerned with the rapidly shifting pattern of population distribution within the state. The identification of these places should thus be useful to policymakers. The consensus of opinion appears to be that decline is a problem and that efforts should be made to prevent outmigration from small towns. Many favor policies aimed at assisting small towns to retain and attract population by bringing in new industries and employment opportunities. The costs of carrying out such policies, however, have prevented their success. This study considered only nonmetropolitan incorporated places with populations greater than 2,500 and a total of 92 places are predicted to decline over the 1970 decade.

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There are undoubtedly numerous smaller incorporated places and unincorporated communities which will also decline in the near future. Obviously, it is not economically feasible to attract industry to all these places. Thus other methods of approaching the problem are needed.

An approach which may be useful in examining the problem involves distinguishing between declining places which are relatively "vital" and those which are "stagnant". A "vital" place is one which, although having a recent history of decline or predicted to decline in the near future, still has a relatively young population with a large number of young adults of prime working age. A "stagnant" place is one with a relatively old population, which has lost most of its young productive population through outmigration.

An attempt was made to identify "vital" and "stagnant" places among the NMI places predicted to decline from 1970 to 1980, and the results are shown in Figure 4. The two types of places were distinguished on the basis of the proportion of the population of each NMI place aged 65 years and older in 1970.[33] Those with greater than 20 per cent of their population of retirement age were designated as "stagnant". Nineteen of the 92 declining places or slightly over 20 per cent were "stagnant".

Different policies are likely to be appropriate for the two types of declining places. Since migration is usually selective of the young and related to economic factors, efforts directed at increas-

FIGURE 4

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GROWING, "VITAL" DECLINING, AND "STAGNANT" DECLINING NMI PLACES

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ing and diversifying employment opportunities may be very effective in stemming population loss in "vital" places. They may be less appropriate, on the other hand, for "stagnant" places. The decline predicted for a "stagnant" place will be mainly due to deaths of elderly residents and outmigration of people of retirement ages. Although increasing the supply of jobs may stem part of the loss of population in such a place, this measure will likely be less successful than when applied to a declining "vital" town. Policies and programs aimed at assisting the elderly in these places would probably be more worthwhile. For example, increased financial assistance may relieve much distress, as poverty is very prevalent among the elderly in Texas -- particularly those in nonmetropolitan areas -- and the government programs of Social Security and Old Age Assistance are often inadequate.[34] Provision of additional health care and proper nutrition may also be welcome in these places.

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FOOTNOTES

1. In 1970 Texas had 24 SMSA's, which included 40 counties. An SMSA, or standard metropolitan statistical area, as recognized by the Bureau of the Census, is "a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or 'twin cities' with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are socially and economically integrated with the central city." U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas, vii.

2. U. S. Bureau of the Census, U. S. Census of Population: 1950. Volume 1, Number of Inhabitants; U. S. Census of Population: 1960. Number of Inhabitants, Texas. Final Report PC(1)-45A; and U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

3. Data employed were taken from the decennial census: U. S. Bureau of the Census, U. S. Census of Population: 1960. Number of Inhabitants, Texas. Final Report PC(1)-45A and U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

4. Population in 1970 for areas annexed between 1970 and 1970 is reported in the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

5. For a summary of central place theory and its implications for spatial distributions, see Brian J. L. Berry, Geography of Market Centers and Retail Distribution (Englewood Cliffs, New Jersey: Prentice-Hall, 1967).

6. Empirical work has supported this hypothesis. For examples see Glenn V. Fuguitt, "The Small Town in Rural America," Journal of Cooperative Extension (Spring 1965), pp. 19-26 and Glenn V. Fuguitt and Donald W. Thomas, "Small Town Growth in the United States: An Analysis by Size Class and by Place," Demography 3 (1966), pp. 513-527.

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7. For examples see Fuguitt, "The Small Town in Rural America;" John Fraser Hart and Neil E. Salisbury, "Population Change in Middle Western Villages: A Statistical Approach," Annals of the Association of American Geographers 55 (March 1965), pp. 140-160; and Glenn V. Fuguitt, "The Places Left Behind: Population Trends and Policy for Rural America," Rural Sociology 36 (December 1971), pp.

8. Texas Highway Department, "Official Texas Highway Travel Map," 1965.

9. The State Planning Regions are twenty-one county groupings originated by the Governor in 1968 to facilitate functional coordination of planning activities within Texas.

10. Rates of change for the regions were computed from 1960 and 1970 county population totals reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

11. Data employed were taken from the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

12. Ibid.

13. Border towns usually provide extra goods and services to meet the nonlocal demands of tourists and of citizens of the adjacent country. In southern Texas and in northern Mexico, the highways have been improved considerably in recent years, resulting in the expansion of tourism and of export trade with residents of Mexico. The extra demands induce expansion of facilities and employment and lead to population growth in the border towns.

14. The 1960 populations of Texas' SMSA's and their 1960-70 growth rates are reporte by the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

15. Employment data were reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

16. Victor R. Fuchs, The Service Economy (New York: Columbia University Press, 1968), p. 51.

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17. Ibid, p. 19.

18. U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

19. Charles Wood and Harley L. Browning, "Texas Population in 1970: 8. The Labor Force," Texas Business Review 47 (September 1973), pp. 207-212.

20. U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

21. Ibid.

22. U. S. Bureau of the Census, U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

23. Employment data were reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

24. U. S. Department of the Interior, Bureau of Mines, Minerals Yearbook 1961 and Minerals Yearbook 1971.

25. Ibid, 1961.

26. U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

27. U. S. Department of the Interior, op. cit., 1961.

28. County rates were computed from employment data reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

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29. U. S. Bureau of the Census, U. S. Census of Population: 1970. Number of Inhabitants. Final Report PC(1)-A45 Texas.

30. Data employed were reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1960. General Social and Economic Characteristics, Texas. Final Report PC(1)-45 C and U. S. Census of Population: 1970. General Social and Economic Characteristics. Final Report PC(1)-C45 Texas.

31. The number of persons per household for places was reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1960. General Population Characteristics, Texas. Final Report PC(1)-45B.

32. Wood and Browning, op. cit., p. 208.

33. Age data was reported by the census: U. S. Bureau of the Census, U. S. Census of Population: 1970. General Population Characteristics. Final Report PC(1)-B45 Texas.

34. Texas Office of Economic Opportunity, Poverty in Texas (1972), p. II-18.